DOCUMENT RESUME

ED 161 548 PS 010 202

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TITLE Nutrition and Its Effects on the Hyperkinetic Child's Behavior and Learning: A Case Study.
PUB DATE 6 Apr 77
NOTE 41p.; Practicum report, submitted in partial fulfillment of requirements for Doctor of Education degree, Nova University.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Behavior Change; *Behavior Problems; Case Studies (Education); Change Strategies; Elementary Secondary Education; Food Standards; *Hyperactivity; *Learning Difficulties; Neurology; *Nutrition; *Theories
IDENTIFIERS *Diet Therapy; Food Additives; Illinois

ABSTRACT

This case study reviews the literature related to diet, behavior and learning and describes procedures and results of a change in the diet of an adolescent girl who had an extensive history of problems at home and at school. Studies of nutritional deficiency, nutritional imbalance, allergies, and synthetic food additives are briefly overviewed. Dietary substance linked to behavior problems and the behavioral characteristics of the hyperkinetic child were identified through review of the related literature, and are summarized in Tables 1 and 2. A 45-item behavior checklist was constructed for parent and teacher use in pre- and post-treatment assessment. The child selected for the study was assessed as having trouble on 39 of the 45 checklist items. Treatment consisted of excluding from her diet (for 14 days) food containing sugar, artificial flavor and color, nitrates, salicylates, MSG, and foods to which the subject was allergic. Comparison of pre- and post-treatment checklists indicates that parents and teacher saw dramatic change in the girl's behavior. She was seen to present problems on only 5 of the checklist items at the end of the treatment. Effects were evident by the third day of the diet. Learning was also judged to have improved. Results are seen to be consistent with previous studies of the effects of nutrition on behavior. Further research is recommended. The behavior checklist, treatment diet and results are also appended. (RH)

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NUTRITION AND ITS EFFECTS ON THE HYPERKINETIC CHILD'S BEHAVIOR AND LEARNING: A CASE STUDY

ED161548

LEARNING

by

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A PRACTICUM PRESENTED TO NOVA UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF DOCTOR OF EDUCATION

NOVA UNIVERSITY

APRIL 6, 1977

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ABSTRACT

The learning and behavior of a hyperkinetic child was studied prior to being placed on a diet free of potentially harmful foods. A review of the literature dealing with the effects of nutrition on the learning and behavior of hyperkinetic children was done in order to identify the behavior common to this type of child and the offending foods. These foods were then removed from the child's diet for a period of seven days. The child's behavior following diet therapy was observed and compared with the pre-diet behavior. This study shows a strong relationship between nutrition and behavior in the hyperkinetic child and recommends that additional research be done to add to the growing body of knowledge in this area.

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Chapter One

INTRODUCTION

Purpose

The theory of Dr. Benjamin Feingold, a pediatric allergist from California, Dr. Lendon Smith, a pediatrician from Oregon, and S. Pattabi Raman, a biochemist from the University of Massachusetts, that nutrition affects the behavior and learning of hyperkinetic children will be tested by identifying a child with hyperkinetic symptoms and placing this child on a controlled diet. This study is particularly relevant today because hyperactivity and the related behavior problem is estimated to affect more than five million children in the United States (Feingold, 1975). As a possible indication of the recent explosion, the California Association for the Neurologically Handicapped estimates that during the period 1961 to 1973, the incidence of hyperkinetic children in the states rose from two percent to an average of 20 to 25 percent; in some cases, 40 percent of the entire school population (Feingold, 1975, p. 55).

According to Dr. Smtih, children act in a rotten way because they feel rotten. He suggests that we shift away from the Freudian concept of illness as being caused by early pottie training or mother fixation at the anal level, to a biochemical imbalance as the prime cause of illness. In his view, the learning and behavior problems of many children struggling in schools today is the result of faulty nutrition and is not psychologically or environmentally induced as previously believed.

Feingold (1975) describes food additives such as artificial flavor and color as drugs. He claims these drugs attack the nervous system of sensitive individuals creating bizarre

behavior and learning problems beyond the susceptible individual's control.

Skinner, in his work with reinforcers, concluded that organisms will make more responses per reinforcer on any kind of intermittent schedule than on continuous reinforcement.

> Tests by pharmaceutical companies show that interval reinforcement schedules are more easily disrupted by a variety of drugs than are ratio reinforcement schedules. Apparently the test animals' counting mechanism is less vulnerable than its timing mechanism. There is a lawful relationship between what drug goes into the body and what behavior comes out (Hill, 1963, p. 70).

According to Lerner (1976), there has been an interest in a number of biochemical and biomedical areas, that may have an impact on the child's ability to learn.

One area under investigation is the connection between nutrient deficiency and learning impairment. Cruickshank (Lerner, 1976, p. 65) suggests that malnutrition may also be related to perception, attention, and other learning related phenomena. The severity of the deficit is related to the age at which malnutrition occurs, the degree and the duration.

In November of 1975, Dr. Raman stated that:

> Trying to understand more fully the performance of the central nervous system as it relates to intelligence, memory, learning, and behavior ranks among the major challenges faced by psychologists and educators of today.

The purpose of this study was to add to the necessary and growing body of knowledge pertaining to the effects of nutrition on the learning and behavior of hyperkinetic children.

This is a relatively new theory and at the moment still very controversial. Many studies need to be done to test the new theory and ultimately support or disclaim it. If nutrition does affect learning and behavior we need to know how to identify its effects. Studies such as the one proposed are especially significant in the case of a new theory

because they frequently help identify the limits of a theory and/or provide new insights into its application.

The inclusion of the results of this study into the Early Childhood Education program at Moraine Valley is imperative because early identification appears to be critical in order to avoid reinforcement of unacceptable behavior patterns and permanent neurological dysfunction (Smtih, 1976; Raman, 1975).

Teachers of young children are the first providers of parent education programs in the community and can alert parents to the effects of nutrition on their child's behavior and learning.

Problem

The problem was to seek data that would aid the child care students at Moraine Valley Community College to support or reject the theory that nutrition affects the learning and behavior in hyperkinetic children.

The interest in recent years in the biochemical and biomedical influences on the child's ability to learn are still theory and require additional research.

For the purpose of this study, the biomedical theories of Dr. Benjamin Feingold (1975) and Dr. Lendon Smith (1976) will be tested. The definition of hyperkinesis and the description of the hyperkinetic child used in this study are as follows:

> The condition of hyperkinesis is a behavioral symptom related to extreme hyperactivity (Lerner, 1975). Hyperkinetic children can only sit for a few minutes at a time and even then fidget and wiggle excessively. They have an extremely short attention span, are likely to talk too much in class, and constantly fight with friends, siblings and classmates. Their actions are described as impulsive or driven. They are easily distracted, racing from one idea and interest to another, unable to focus attention.

Chapter Two

BACKGROUND AND SIGNIFICANCE

Review of Research

S. Pattabi Raman (1975) in his discussion of nutrition in the actualization of the potentialities of the child claims that the role of nutrition in behavior and learning is self-evident to researchers in biomedical disciplines but neglected by both psychologists and educators. According to Raman (1975), trying to deal with the child's behavior and learning problems, with intervention programs that do not take the biological integrity of the child into consideration, will not achieve optimum results.

Roger Lewin (1975) predicts a generation of clumsy, feeble-minded millions due to the lack of necessary nutrients to the brain during the first two years of life. According to Lewin, the brain simply cannot create the structures--the cells, the wiring, and the complex circuits--that fuse to form the functioning human mind if it is deprived of an adequate diet and environmental stimulation.

Lewin (1975) reports on the research of Stephen Richardson which shows nutritionally deprived children to have a variety of learning behavior problems in schools.

There are a number of biochemical theories that are purported to have an effect on the child's ability to learn and behave in a socially acceptable way.

Hallahan and Cruickshank (1973) claim that there's a link between nutritional deficiency and the child's inability to learn. The severity of the deficit is related to the age at which malnutrition occurs, the degree, and the duration.

Longitudinal studies conducted in countries where protein calorie nutrition is endemic (Cravioto, 1972) showed that poor intersensory integration was one of the most common

symptoms found in children suffering from this deficiency. Poor intersensory integration also affects the maturation of the organs of perception and the abilities on which they depend--visual, auditory, and kinesthetic--all of which contribute to the achievement of reading and writing skills. If the development of these abilities is uneven due to early malnutrition, children will come to school with significant handicap in learning how to read and write. To this extent, poor intersensory integration is a suppressor of psychological potentialities because it impairs ability to learn.

Smith (1976) insists that the successful functioning of the child depends upon the full nourishment of the brain. He goes on to say that children with sensitive nervous systems cannot handle sudden rises in sugar. These children lie, cheat, and steal even though they have a conscience. According to Smith, the sudden drop in blood sugar causes his body to scream for sugar. There is not enough energy to keep the circuits in his conscience operative, and so he steals the candy. He may even deny he did it; the brain needs energy to store memories.

> What starts as a chemical, neurological, genetic imbalance becomes a psychiatric problem. Once this badness concept becomes established, it is extremely difficult to chisel it out of the brain, where it has become a part of the psyche (Smith, 1976, p. 45).

Dr. Benjamin Feingold (1975) believes that synthetic food additives and foods containing salicylates do, in some unknown way, tamper with the brain and nervous system by short circuiting some functions in a particular group of children genetically predisposed to these chemcials.

Cott (1972) discusses the positive results of megavitamin therapy for children with learning problems. Raman (1975) reports significant improvement in achievement of children who have learning difficulty when a prescription of megavitamins (Cott, 1972)

was combined with the elimination of foods containing artificial flavor, artificial color and salicylates (Feingold, 1974).

Dr. Linus Pauling, an Orthomolecular Psychiatrist, who has twice won the Nobel Prize believes that behavior disorders, particularly schizophrenia, are the result of an imbalance in the body's chemistry. The "right molecules" to correct this biochemical irregularity, are frequently massive doses of vitamins B, D and E, as well as certain minerals, such as zinc (Gittelson, 1976).

Could mothers who describe their hyperkinetic child, as being like Dr. Jekyl and Mr. Hyde, be actually describing a mild form of schizophrenia caused by a chemical imbalance?

According to Raman (1975):

> . . No educator would deny the critical role of intersensory integration in the acquisition of early sensorimotor and manipulative skills which are fundamental prerequisites for cognitive, language, and socioemotional development. But how many educators are aware of the part played by nutrition in achieving such an integration (p. 27)?

The behavior disturbances of hyperkinetic children may include any or all of the following: short attention span, disordered behavior, emotional lability, social incompetence, defective work habits, impulsiveness, and learning disorders (Raman, 1975).

According to Smith (1976), the increased consumption of sugar in the American child's diet may be the explanation for the increase in hyperactivity in recent years. The sale of sugary foods has increased 17 percent in 1976 alone.

Smith claims that:

> . . . sensitive children cannot handle the sudden rises in quick sugar. Their bodies over-react by excreting extra insulin. This results in a sudden drop in the sugar level in the bloodstream. The resulting sudden drop triggers the adrenal glands to pour out adrenaline whose function is to release sugar from the liver and thus restore the blood sugar level (p. 42).

Smith suggests that the by-product of the increase in adrenaline is frantic, purposeless muscular activity.

Dr. H. J. Roberts, in a paper presented to the 1968 annual conference of the Association for Children with Learning Disabilities, reported the results of a study involving 29 patients--24 children and 5 adults--who had severe reading problems.

Twenty-one of the subjects were placed on a strict diet that eliminated table sugar and foods containing simple sugar. All of the subjects demonstrated improvement in reading and 12 of these improved in other school subjects as well (Gearheart, 1973).

Gearheart (1973) claims that children suffering from hypoglycemia (low blood sugar) are victims of pathological drowsiness, have poor attention spans, exhibit signs of extreme nervousness. The suggested treatment for hypoglycemia is the total abstinence of simple sugars.

Dufty (1975) adds migrane headaches, stomach aches and blurred vision to the list of symptoms produced by hypoglycemia.

Dunn (1973) and Powers (1974) were successful in eliminating behavior problems and improving academic achievement in children who were found to be hypoglycemic, a condition due to a deficiency in the level of blood sugar, by placing the children on a high prctein, low starch, sugar free hypoglycemic diet.

Allergies can also affect learning (Harvard, 1973). Removal of the offending food or pollen can frequently restore the child's ability to perform school tasks successfully.

An allergy is an acquired, specific, altered capability to react, based on an antigen-antibody reaction (Harris and Shure, 1969).

Some common antigens, substances that enter the body and start off the chain of circumstances, that results in the allergic reaction, are pollens, house dust, mold, and foods such as eggs, milk, citrus fruits, wheat, and chocolate.

Smith (1976) tells us that the frequent association of hyperactivity and allergy is related to the reciprocal exhaustion produced in the brain and the adrenal glands.

In 1969, Harris and Shure talk about some allergic patients "working themselves to death" (hyperactive) while others tended to be very lazy (hypoactive). The doctors also mention problems in social adjustment in young children, hostility and problems with teachers and school work as being common symptoms of allergy victims (p. 26).

Many allergic children have been labeled "slow learners." Some have actually been assessed as retarded, and some have been diagnosed as perceptually or neurologically damaged (Lerner, 1976).

Raman, in a speech before the National Association for the Education of Young Children (Dallas, November, 1975), identified allergies, sugar, salt, monosodium glutamate, and other additives, notably artificial flavor and color, as being the primary agents in a child's diet that may cause a disruption in the organisms' "biological integrity."

Feingold (1975) believes that synthetic food additives might, in some unknown way, tamper with the brain and nervous system by short-circuiting their functions in children genetically predisposed to these chemicals.

Jacqueline Verrett, Ph.D., an FDA research scientist, reports that animal experiments with food additives caused cancer, birth defects, genetic mutations, as well as liver, brain and heart damage.

She admits that these test animals were given large doses of the additives, but this is balanced by the fact that humans are generally recognized to be more sensitive to chemical harm than animals. Humans are, for example, ten times more sensitive than rats, the most common test mammals (p. 68).

Marvin Grosswirth (1976) claims that the average American consumes a variety of chemicals in his diet each day. Many of thse additives are suspected of causing birth defects, genetic damage, hyperactivity in children, and a chilling catalogue of cancers. Many of these chemicals are unnecessary. They are purely cosmetic. Artificial flavors (a drug) and artificial colors, many of which are derived from coal tar, are high on the list of dangerous unnecessary additives.

Nitrites, the additives used in bacon, hot dogs, some ham and lunch meats are especially harmful because nitrites easily combine with amines to form a compound called nitrosamines. Nitrosamines have been shown to cause cancer in many animals. Nitrates also combine with hemoglobin. The substance formed will not carry oxygen as normal hemoglobin does. The developing brain of the infant is especially sensitive to oxygen deprivation. This is why nitrates are not permitted in baby food (p. 47). (Hot dogs are a favorite lunch food for children between the ages of nine months and two years of age, however.)

Monosodium glutamate is another chemical that has been banned from baby food already and is considered highly suspect by most researchers.

A study conducted by the University of Pittsbrugh strongly suggests that a diet free of most natural salicylates, artificial flavors, and artificial colors reduces the perceived hyperactivity of some children suffering from hyperkinetic impulse disorder (August, 1976).

This above study by the University of Pittsburgh supports Dr. Feingold's (1975) hypothesis that children sensitive to aspirin (acetylsalicylic acid) might also be sensitive to foods containing natural salicylates and the drug tartrazine (yellow dye #5). Feingold formulated a diet that eliminates additives and salicylates from the diet of hyperkinetic children (pp. 169-174).

Dr. Clyde Hawley, a pediatrician, and Dr. Robert Buckley, a psychiatrist, have successfully treated children with hyperkinetic disorders by restricting dietary intake to substances free of food dyes and salicylates. Junk foods such as hot dogs, ice cream, candy and soft drinks trigger hyperkinesis in a sensitive child, Hawley and Buckley claim (Gearheart, 1976).

Feingold (1975) reports numerous case histories of children and adults who had personality disturbances, learning disabilities, and various kinds of skin disorders, and other allergic type complaints, who responded favorably, immediately following diet control.

According to Feingold (1975) food processors, in order to prevent spoilage and increase the shelf life of food, dumped everything into food, from formaldehyde, the chemical used to preserve corpses, to borax, which had better use as a cleansing material. In addition, pickles were tinted with copper sulphate, and candy with red lead, that was designed for use on ship bottoms.

The food additive industry that began simply in post civil war days has grown technologically and synthetically into a multimillion dollar business of today.

At the present time it is virtually impossible for the average child to go through an ordinary day without ingesting a vast variety of food additives. Many of these

additives are suspected (Grosswirth, 1976) of causing birth defects, genetic damage, hyperactivity in children, and a host of cancers. At worst, some food additives are capable of causing death and destruction; at best they give foods and beverages colors, tastes, and textures they do not naturally have.

According to Grossman the FDA boasts that the American consumer is the most protected in the world. Yet the FDA permitted Red Dye No. 2, while the Soviet Union, France and other countries banned it. France allows only seven flavoring additives, as compared with the 300-odd used in the U.S.A.

Dr. Jacqueline Verrett, a biochemist who works for the FDA, claims that humans are at least ten times more sensitive than the laboratory rats, to the average chemical. She predicts an epidemic of cancer by the year 2000 when the effects of all the additives in our food will be visible to all (Grosswirth, p. 50).

Dr. Michael F. Jacobson, a molecular biologist who is director of the Center for Science in the Public Interest claims that additives have also contributed to the deterioration of our food supply.

> All the artificial flavorings and colorings are replacing real fruit flavors. Preservatives are contributing to packaged foods that are low in nutrients and high in sugar and fat and made out of refined grains rather than whole grains (Grosswirth, p. 49).

In a land of plenty, our junk food children appear to be suffering from malnutrition just as real as children whose bellies are swollen from hunger. The question about the effect of this kind of malnutrition on the child's brain development is a frightening one.

Consumers Union issed a bulletin in September, 1976 stating that commercial baby foods are filled with things babies shouldn't eat, such as added sugar, salt, and

modified food starch (Sun Times, October, 1976).

According to a University of Pittsburgh research team, hot dogs, candy, pop, and other foods containing artificial flavors and colors may cause hyperactivity (Conners, 1976).

In a controlled study, the University of Pittsburgh researchers showed that by eliminating foods containing these additives many hyperactive children settled down to normal.

The results of this study strongly suggests that a diet free of most natural salicylates, artificial flavors, and artificial colors reduces the perceived hyperactivity of some children suffering from hyperkinetic impulse disorder.

Eliminating all food additives and all salicylates from the family diet restored a hyperactive Canadian boy to normal (Prevention, 1975).

Institutional and Modular Significance

Traditionally, doctors have treated hyperkinetic children with drugs; educators have resorted to special education and counseling; and parents have been trained in behavior modification techniques to help the children with their behavior and learning problems. These techniques have not been very successful. Critics question the use of drugs claiming that they only mask the symptoms and don't really get to the cause.

Educators, physicians, psychologists and parents need to know if children with learning and behavior problems can be helped by diet therapy. If diet therapy is the answer, the knowledge must be disseminated quickly to the parents of children with learning and behavior problems as well as the professionals from whom they seek help.

Children who suffer from hyperkinesis have poor attention spans, a very low frustration level, exhibit aggressive behavior, have poor memories, are in constant motion, are impulsive and have few friends. Children such as these receive very few rewards from the children and adults with whom they come in contact. Symonds (1955) tells us that acceptance and approval are basic incentives or goals for learning. The hyperkinetic child who is present in the home or classroom, untreated, is very difficult to accept and love. If, as Symonds claims, learning depends on rewards then it is no wonder these youngsters fail to learn.

Moraine Valley Community College has a two year vocational program in Child Care. Students in this program will be, in many cases, the first professional educators to whom the parents of very young children are exposed. They will be in a position to use the results of this study to identify hyperkinetic children early and to refer them to a physician with experience in diet therapy as a possible solution.

Why some children fail to learn is relevant to the Learning Theory module. Incorporating this information, along with a study dealing with one of the most current and controversial remediation theories, namely that of diet control, into Moraine's Child Care program, will keep the program up to date. A third benefit will be to motivate the students to keep up with new developments in this area once they have graduated.

Chapter Three

PROCEDURES

The first step in this study was to identify the substances that must be either added to or deleted from the diet in order to achieve what Raman calls "Biological Integrity." This was done in two stages. First a careful search of the literature in education, psychology and medicine. The search was done for two reasons; to identify the substances that must be either added or deleted from the diet and secondly to identify the behaviors commonly present when the body chemistry is out of balance.

The search of the literature yielded six basic substances -- allergies, artificial flavors and colors, monosodium glutamate, nitrite, salicylate, sugar -- that prevent the body from achieving biological integrity (Table I, Appendix A).

The second step was to identify the behavior of the hyperkinetic child and design a behavior checklist from the results. All of the researchers were fairly consistent in their description of the behavior of this type of child (Table II, Appendix B).

The behavior checklist (Appendix C) that was designed from the research was designed for use by both parents and teachers.

The third step was to identify a child who exhibits these behaviors. This was accomplished by first interviewing teachers and then the parents of children who appeared to be having difficulty with classroom behavior and learning. The teacher and parent of the child selected for the study were asked to complete the behavior checklist for the child prior to diet therapy.

Local school counselors were interviewed in order to identify a child exhibiting the behaviors listed on the checklist. Three children were identified and checklists given to their parents and teachers. All three appeared to have a "biological integrity" problem.

The child selected for the study had a score of 39 yes responses on the check-lists (Appendix E). She was in serious difficulty in school with her studies as well as her behavior. She was frequently disciplined with detentions and was one step away from suspension. She and her parents expressed a sincere desire to cooperate in every way with the study.

The fourth step was to place the child on a diet that would restore biological integrity for a period of 14 days (Appendix D). The diet the child was placed on is a combination of the Feingold diet and the recommendations of Smith (1976), Raman (1975) and others listed in Table I (Appendix A).

At the end of the 14 day diet, the teacher and parents were asked to complete another behavior checklist (Appendix E).

A period of 14 days was chosen for the study for the following reasons:

1. The body needed a three day fast initially to purge itself of all toxic substances. During this period the subject consumed unsweetened juices and vegetable broth (Bieler, 1965; Harris and Shure, 1969; Dufty, 1975).

2. The teacher, who sees the subject for two 50-minute periods per day, needed sufficient time to observe the subject under a variety of situations to note behavior changes.

Feingold (1974) observed changes in the behavior of his patients in ten days. Dufty (1975) and Harris (1969) observed dramatic behavior change after three days.

Eliminating sugar, artificial flavor and color, nitrites, salicylates, MSC, and the foods Janey is allergic to required a lot of effort on the mother's part. Most of the convenience foods and junk or snack foods were out. They are all either sugar coated or artificially dyed and flavored. Luncheon meats, ham, bacon, sausages and hot dogs had to be purchased at the health food store or eliminated from the diet since they are colored and preserved with nitrite. However the situation with this girl had gone on long enough for the parents to have exhausted

all other means of modifying her behavior. Their desperation provided the motivation to persist.

The fifth step was to analyze the data supplied by the pre and post behavior analysis check sheets in order to identify areas of improvement and to interview Janey, her parents and teachers for their perception of any differences in her attitude, learning ability or motor behavior as a result of the diet therapy.

The final step is to compare the effect of the diet on Janey with the findings of Raman (1975), Smith (1976), and Feingold (1974) in order to determine the validity of their theory as it relates to Janey.

Chapter Four

RESULTS AND DISCUSSION

Predict Behavior

The child, a fourteen year old girl, wanted desperately to "be good" (Feingold, p. 74). She listened carefully when the purpose of the study and the diet was explained.

The child's mother claimed the child had difficulty in school from kindergarden to the present. Teachers complained because she would sharpen her pencil ten times a day, walk around the room without permission, resent correction and generally pushed school rules to the limit. In sixth grade she broke a boy's hand because he annoyed her. Her teacher felt that her poor grades were due to an "I don't care attitude" rather than inability on her part. They describe her as a perfect athlete who would perform dangerous stunts after little or no practice.

Her parents claimed that she was always up by 5:30 a.m. They called her the family alarm clock. She frequently started several projects at once and would have to be coaxed or punished before any one of them would be completed. Her irritability and aggressiveness created a great deal of fighting and arguing between her and her two brothers and two sisters. She had frequently highs and lows, almost a Jekyl and Hyde personality. She cried or screamed at the slightest provocation.

The child claimed that headaches make her nervous. She dislikes teachers because they pick on her, as do her brothers and sisters, but she said she didn't care. She can't read very well, and she finds it almost impossible to pay attention in class. Her grades are very poor except in Art and Gym where she is free to move around. She likes her Art teacher very much and doesn't want to lose her "cool" in his class. She seemed afraid that she would have a temper tantrum in his class when things bother her. The things she refers to are other kids, dumb projects, and time

limits. Without provocation she suddenly began to cry and expressed her hope that the diet would help her to be nice.

Post Diet Behavior

The post diet results (Appendix E) show dramatic improvement, except in a few areas. Feingold (1974) feels that some behaviors have become habitual in a child of Janey's age and will need to be extinguished by means of behavior modifying techniques if they still present a problem.

The child's parents and teachers were very enthusiastic about the change in her since she started the diet. The changes in attitude and social behavior were obvious and very marked by the third day of the diet. By day five she actually overslept and was late for school. She had never slept past 5:30 a.m. in her life in spite of the fact that she would get to bed quite late at times. She also was able to handle being late for school without a temper tantrum. She had a minor set back on the fifth day when a classmate gave her an aspirin for cramps. She was menstruating and had always taken an aspirin to ease the cramps in prior months. She knew the diet prohibited aspirin but she thought one would be okay. By the time she came home from school she was quite irritable. The teachers she had for the last two periods of the day did not notice any anti-social behavior but her family did. According to her mother she was particularly irritated because her teen age sibling had the television on too loud. In spite of this minor set back she got a 92% on a short unit history quiz given on the morning of the tenth day of her diet.

She still appears to enjoy performing dare devil stunts, however. She has received a great deal of positive reinforcement from her peers for years and as a result this behavior, while possibly induced by her hyperkinesis, will be difficult to extinguish (Skinner) as long as the reinforcement exists.

She still rushes into a task before all the directions have been given; however, when she ran into difficulty she asked for help instead of tearing up her paper. Her teacher considers this a definite step forward.

The same thing applies to her impatience with herself and others and her short attention span. They are still evident but the degree is within more acceptable limits.

Her mother still notices her lying about wearing her sisters' clothes. At this point it is not felt that this behavior is related to nutrition.

Both parents and teachers feel that her comprehension in all areas is greatly improved. The reading skill itself still needs improvement. Now that her ability to sit still and to concentrate has been improved, she should be able to read more, if successfully motivated. Only by practicing (reading more) will she improve her skill.

When the child was interviewed she described the following differences in her attitude and motor behavior. According to her she is no longer nervous; teachers are nicer to her; the pounding headaches are gone; and music and loud talking don't bother her any more. She was especially pleased about sleeping late. She said she always hated getting up before everyone else because the house was so lonesome. She was excited about her history quiz but she honestly feels it was an accident. "I'm really dumb," she claims. "People (i.e. kids and teachers) don't bother me as much," she said. When asked what bother you means, she said, "you know bug you; like get on your case; make you upset."

The studies of Raman (1975), Smith (1976), and Feingold (1974) show marked improvement in the behavior and learning of subjects when the offending foods and additives were removed from their diets.

In conclusion it appears that our study supports the theory that sugar, artificial flavor, artificial colr, monosodium glutamate, nitrites and any natural foods that are known to cause an allergic response can affect a sensitive child's behavior and learning.

Janey improved dramatically in behavior. Her learning, whiie less dramatic, also improved as the post diet checklist demonstrates. The results also support Feingold (1975) who tells us that:

1. The hyperactive disturbance is nonimmunologic. There is no natural body defense against it.

2. Those children who react to the synthetic additives have genetic variations--not abnormalities--which predispose them to such adverse responses. Feingold goes on to say that he believes the hyperactive learning disabled child is not alone. The food supply is a common environmental factor, jointly utilized by the aggressive teenager and aggressive adult.

There are over five million hyperkinetic learning disabled children in the United States. Over half of these children are on behavior management drugs. How many more will join the list with each new food additive the corporate chemical giants invent would be pure speculation. What will happen when these youngsters turn into aggressive teenagers and aggressive adults?

We know so little about the chemistry of the human body. The vitamin and mineral content of various foods is a matter of record but exactly how the body metabolizes certain foods is still a mystery. How to detect errors, genetic or environmentally induced, in metabolism and to isolate the offending substance is the challenge before us.

Smith (1976) believes that sugar and other additives in the food supply alter the ability of the cortex to function. The victim begins to operate at a mid-brain or animal level. At this level reason gives way to instinct. The person is aggressive, clever in a cunning way, cruel, and very defensive as Janey's pre diet behavior so clearly demonstrated.

Why the F.D.A. permitted toxic substances to be added to our food supply is the question of the hour. Verrett (1975) leaves us with the impression that the F.D.A. is full of persons with strong ties and loyalties to the food industry. As a result they

accept less than satisfactory research as evidence that an additive is harmless. Can we afford to permit this laisse fairre approach to food additives any longer? Does the human misery of the Janeys of the world and all the people who love them have to reach epidemic proportions before we react? Are we willing to sit by and permit the additive craze to multiply to the point that everyone's nervous system is affected. If so, the next generation will indeed fulfill the prophesy and become a feeble minded mass of hostile, aggressive individuals.

Chapter Five

IMPLICATIONS AND RECOMMENDATIONS

Implications

The implications of this study reach into each and every family. Feingold (1974) estimates that we have over 2,800 chemicals added to the American food supply. Because of the quantity of added chemicals and the variety of convenience and junk foods he believes that everyon'e diet includes some chemical that is not compatible with their own body chemistry. Could this explain the aggressive adult as well as the temper tantrums of some very young children?

Verrett (1975) claims that the synergistic effect has never been studied. The synergistic effect is the possible effect on the body of two or more additives coming together in one meal. Frequently the mixing of two or more non-food chemicals (additives) produces a totally new compound whose effect on the human being is completely unknown. A known example of this is the nitrite in bacon mixing with the amines in coffee, tea, or coke to form a mitrosamine. In this instance we know that nitrosamine is a carcinogenic substance. Are there other carcinogenic, or mutagenic compounds being formed in our stomachs after every meal? Are there compounds being formed in the stomachs of pregnant women that are harmful to the developing fetus? These questions are too serious to be ignored. The world wide concern among scientists regarding controlled genetic manipulation in a laboratory is perfectly understandable but it becomes a moot point if the chemicals we ingest every day are silently creating uncontrolled genetic mutations that could arrive on the scene twenty or thirty years from now to plague us.

Some additives are necessary preservatives and even these need to be reexamined under the critical eye of independent biochemists and substitutes found for those that show

up as harmful. The remainder, the majority of additives that are purely cosmetic, should be removed immediately from the food supply until they are adequately tested.

The average child consumes approximately 102 different chemicals along with his food each day. Many of these chemicals are deadly poison if consumed in large quantities. Could they still be killing our children one cell at a time? Could they be creating a host of new illnesses? Are they, in fact, the cause of the increasing numbers of hyperkinetic learning disabled children? Assuming that Smith, Raman, and Feingold are correct and the brain is the organ that is most sensitive to the foreign chemicals (drugs) then the present increase in all types of learning disabilities, including nonreaders, and behavior disabled children could be another byproduct of the additives produced by the corporate chemical giants.

Dr. Smith (1976) believes that the added sugar, milk, bleached flour and additives in our food is overtaxing all of the body's resources, making all of us more susceptible to stress. Can this be the reason that some people tend to blame stress as the causative factor rather than a symptom?

Future research is needed and quickly before more children are damaged by drugs with harmful side effects. Additives are drugs. Some of them may be harmless; some of them may be harmful. The point is that we really don't know. If only one percent of the population is vulnerable we could be talking about two billion people. If they went into a pharmacy and purchased a drug to treat some illness they would be cautioned about the possible side effects. Not so when they consume the drug in their food. Unfortunately the food processors who add all these drugs to the food supply can't warn people about side effects because they haven't researched the drug extensively (Verrett, 1975).

The cumulative effect of these drugs is also relatively unknown. Are some drugs stored in the body until a highly toxic dose is reached before its effects are manifested?

Every major university with research facilities should make this one project a top priority research project. It can't afford to wait. The drugs are already in our food in large numbers (over 2,800). It is sheer lunacy to permit the chemical--food processors to do their own research. They have a vested interest in the additive business. Answers to the questions about the drugs we call food additives must be found. The human race has a lot at stake, our cortex. In other words, people have nothing to lose but their minds.

Recommendations

The first recommendation is to include a workshop on nutrition as a possible cause of a child's behavior and learning problems at the annual Child Care Conference held at Moraine Valley Community College. The conference, sponsored by the Child Care program, gives parents, students, and professionals in the community an opportunity to hear about new developments in the field.

A second recommendation is to incorporate the results of the study and the questions it raises into the content of Child Care Physical Health and Hygiene class.

And, thirdly, as a member of the speakers bureau at Moraine Valley Community College, to recommend to all parents of very young children who schedule workshops, that they eliminate all additives from their child's diet (a better to be safe than sorry philosophy) until the case for or against additives has been resolved.

The results of this study will also be shared with the psychology and special education instructors at Moraine Valley at the next course group meeting.

And, finally, the study will be submitted to E.R.I.C. so that other educators can benefit from the results.

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APPENDIX A

TABLE I
SUBSTANCES THAT PREVENT BIOLOGICAL INTEGRITY

Source	Allergies	Artificial Flavor and Color	Monosodium Glutamate	Nitrite	Salicylate	Sugar
Connors		*				
Dufty						*
Dunn and Powers						*
Feingold	*	*	*	*	*	
Gearheart	*	*	*			*
Grosswirth						*
Hawley and Buckley		*		*	*	
Raman	*	*	*	*	*	*
Smith	*	*	*	*	*	*
Verrett		*	*	*	*	*

APPENDIX B

TABLE II
A PROFILE OF HYPERKINETIC BEHAVIOR

	Feingold	Gearheart	Harris Shure	Lerner	Raman	Smith
Constant motion	*	*	*	*	*	*
Hypoactive	*	*	*			
Aggressive	*	*	*	*	*	*
Impulsive	*	*	*	*	*	*
Poorly coordinated	*	*				
Irregular sleep habits	*		*		*	
Frustrated easily	*	*	*	*	*	*
Attention span short	*	*		*	*	*
Memory poor	*	*	*	*	*	
Antisocial	*	*	*	*	*	*
Headaches/ Stomach aches	*		*		*	
Learning Problems	*	*	*	*	*	*

APPENDIX C

CHECKLIST

Name _____ Date _____

Birthdate _____ Observer _____

	YES	NO
1. Marked hyperactivity		
Fidgets constantly		
Cannot sit still		
2. Hypoactivity		
Work incomplete		
Appears lazy		
3. Aggressive		
Dare-devil enjoys dangerous activities		
Fights with little provocation		
Irritable		
Low tolerance for frustration		
Disrupts school or family activities		
Temper tantrums		
4. Impulsive		
Unpredictable behavior		
Rushes to perform a task before directions are complete		
Overreacts to stimulus		
5. Coordination		
Clumsy		
Difficulty with eye/hand tasks such as cutting, writing, buttoning, catching a ball, etc.		
Difficulty with gross motor tasks such as hopping, skipping, balance beam activities, bike riding, etc.		
6. Sleep habits irregular		
Light sleeper		
Early riser		
Requires little sleep		
Very deep sleeper		
Difficult to awaken		
Requires ten or more hours of sleep per day		

YES NO

7. Low tolerance for frustration
   - Easily provoked to aggression
   - Cries or shouts easily
   - Impatient with self and others
   - Sensitive to sound

8. Short attention span
   - Moves quickly from one project to another
   - Highly distractible
   - Is unable to stick with a task

9. Memory
   - Poor short term memory
   - Can't handle abstraction
   - Poor long term memory
   - Inability to concentrate

10. Social behavior
    - Abrupt changes of mood
    - Cries easily
    - Lies easily
    - Irritable
    - Behavior inappropriate for the situation
    - No respect for authority
    - Feels rejected by family and friends

11. Physical complaints
    - Dark circles under the eyes
    - Headaches
    - Stomach aches

12. Learning problems
    - Difficulty reading
    - Difficulty comprehending what is read

Comments:

APPENDIX D

DIET

Three groups of foods are eliminated by the diet:

Group I is made up of a number of fruits and two vegetables (tomato and cucumber). This group of foods contains natural salicylates.

Group II is made up of all foods that contain a synthetic (aritifical) color or flavor nitrites and monosodium glutamate.

Group III is made up of a number of foods that produce an allergic response in the subject.

In addition to the above, all foods with white flour and white sugar are prohibited.

GROUP I

This is the list of fruits and vegetables that contain natural salicylates. They must be omitted in any and all forms-- fresh, frozen, canned, dried, as juice or as an ingredient of prepared foods.

FRUITS	VEGETABLES
Almonds	Tomatoes and all tomato products
Apples	Cucumbers (pickles)
Apricots	
Berries	
Blackberries	
Boysenberries	
Gooseberries	
Raspberries	
Strawberries	
Cherries	
Currants	
Grapes and raisins or any product made of grapes, e.g., wine, wine vinegar, jellies, etc.	
Nectarines	
Oranges (Note: grapefruit, lemon and lime are permitted)	
Peaches	
Plums and prunes	

GROUP II

All foods that contain artificial color and artificial flavor are prohibited.

All foods that contain artificial color, artificial flavors, nitrites, and monosodium glutamate are not listed. Such a list is not practical. Do not use any foods that contain these substances.

The safest approach is to carefully read the labels. Upon checking the market, a number of items will be found to contain no artificial color or flavor.

There are some permitted food items that must be prepared at home to avoid synthetics.

NOT PERMITTED	PERMITTED
Cereals	Cereals
All cereals with artificial colors and flavors	Any cereal without artificial colors or flavors, dry or cooked
All instant-breakfast preparations	
Bakery Goods	Bakery Goods
All manufactured cakes, cookies, pastries, sweet rolls, doughnuts, etc.	Any product made with oat or corn flour and honey. Whole wheat is usually dyed
Pie crusts	
All bakery goods homemade with white flour and sugar	
Frozen baked goods	
All packaged baking mixes	
Luncheon Meats	All Meats
Bologna	
Salami	
Frankfurters	
Sausages	
Meat Loaf	
Ham loaf	
Ham, bacon, pork	
Poultry	All Poultry except stuffed
All barbequed types	
All turkeys with prepared basting, called "self-basting;" prepared stuffing	

NOT PERMITTED	PERMITTED
Fish	All Fresh Fish
Frozen fish filets that are dyed or flavored; fish sticks that are dyed or flavored	
Desserts	Desserts
Manufactured ice creams	Watermelon
All powdered puddings	Bananas
Sherbet, ices, gelatins, junket, puddings	Pears
All dessert mixes	Pineapple
Flavored yogurt	Gelatins--homemade from pure gelatins, with any permitted natural fruit or fruit juices
Candies	Candies (keep to a minimum)
All manufactured types, hard or soft	Homemade candies, without almonds, made with honey
Beverages	Beverages
Cider	Grapefruit juice
Wine	Pineapple juice
Beer	Pear nectar
Diet drinks	Guava nectar
Soft drinks	Seven-Up
All instant-breakfast drinks	
All quick-mix powdered drinks	
Tea, hot or cold	
Prepared chocolate milk	
Miscellaneous Items	Miscellaneous Items
Oleomargarine	All cooking oils and fats
Colored Butter	Sweet butter, not colored or flavored
Mustard	Mustard prepared at home from pure powder and distilled vinegar
All mint-flavored items	Jams or jellies made from permitted fruits, not ariticially colored or flavored
Soy sauce, if flavored or colored	Honey
Cider vinegar	Homemade mayonnaise
Wine vinegar	Distilled white vinegar
Commercial chocolate syrup	
Barbeque-flavored potato chips	
Cloves	
Catsup	
Chili sauce	
Colored cheeses	

GROUP III

FOODS JANEY IS ALLERGIC TO:

NOT PERMITTED

Chocolate
Wheat
Citrus Fruits
Milk and all milk products
Mold - mushrooms
Tourateen - (a mold grown on petroleum used as a meat and egg substitute, a stabilizer and a flavor enhancer)

Sundry Items

Most over-the-counter medications contain aspirin as well as artificial flavors and colors, e.g., Aspirin, Bufferin, Excedrin, Alka-Seltzer, Empirin, Empirin Compound, Anacin.

All toothpastes and toothpowders*
All mouthwashes
All cough drops
All throat lozenges
Antacid tablets
Perfumes

*A salt-and-soda mixture can be used for cleaning teeth.

APPENDIX E

CHECKLIST

	Prediet		Postdiet	
	Yes	No	Yes	No
1. Marked hypersctivity				
Fidgets constantly	+*			+*
Cannot sit still	+*			+*
2. Hypoactivity				
Daydreams		+*		+*
Appears lazy		+*		+*
3. Aggressive				
Dare-devil, enjoys danger	+*		+*	
Fights with little provocation	+*			+*
Irritable	+*			+*
Low tolerance for frustration	+*			+*
Disrupts school or family activities	+*			+*
Temper tantrums	+*			+*
4. Impulsive				
Unpredictable behavior	+*			+*
Rushes to perform a task before directions complete	+*		+*	
Overreacts to stimulus	+*			+*
5. Coordination				
Clumsy	+*			+*
Poor eye/hand coordination	+*			+*
Poor gross motor (hop, skip, jump, balance beam, etc.)	+*			+*
6. Sleep habits irregular				
Light sleeper		*		*
Early riser	*			*
Requires little sleep	*			*
Very deep sleeper	*			*
Difficult to awaken	*			*
Requires ten or more hours of sleep per day		*		*

NOTE: The teacher's responses are identified by a plus (+) sign and the parents' with asterisks (*).

	Prediet		Postdiet	
	Yes	No	Yes	No
7. Low tolerance for frustration				
Easily provoked to aggression	+*			+*
Cries or shouts easily	+*			+*
Impatient with self and others	+*		+	*
Sensitive to sound	+*			+*
8. Short attention span				
Moves quickly from one thing to another	+*		+*	
Highly distractible	+*			+*
Can't stick with a task	+*			+*
9. Memory				
Poor short term memory	+*			+*
Can't handle abstraction	+			+
Poor long term memory	+			+
Inability to concentrate	+*			+*
10. Social behavior				
Abrupt changes of mood	+*			+*
Cries easily	+*			+*
Irritable with friends	+*			+*
Behavior inappropriate for the situation	+*			+*
No respect for authority	+*			+*
Feels rejected by family and friends	+*			+*
Lies easily	+*		*	+
11. Physical complaints				
Dark circles under eyes	+*			+*
Headaches	+*			+*
Stomach aches	+*			+*
12. Learning difficulty				
Poor reader	+*			+*
Poor comprehension	+*			+*